V. REMARKS

Claim 25 is rejected under 35 USC 112, second paragraph, as indefinite for allegedly failing to particularly point out and distinctly claimed the subject matter of the invention. The claim is amended to obviate the rejection. Withdrawal of the rejection is respectfully requested.

Claim 22 is rejected under 35 USC 102 (b) as being anticipated by or, in the alternative, under 35 USC 103(a) as obvious over U.S. Patent No. 5,626,913 to Tomoeda et al.

Claim 23 is rejected under 35 USC 102 (b) as being anticipated by U.S. Patent Application Publication No. 2002/0076658 to Matsushita et al.

Claim 24 is rejected under 35 USC 103 (a) as being unpatentable over U.S. Patent Application Publication No. 2002/0076658 to Matsushita et al. in view of U.S. Patent Application Publication No. 2002/0123011 to Kawano et al.

Claim 25 is rejected under 35 USC 103 (a) as being unpatentable over U.S. Patent No. 6,371,667 to Kitano et al. in view of U.S. Patent No. 6,300,043 to Konishi et al.

The substantive rejections set forth immediately above are respectfully traversed.

With regard to claim 22

The substrate processing apparatus of claim 22 includes "controlling means for controlling a distribution of a dissolving characteristic of the resist against a developing solution used for developing the resist in a direction of a thickness of the resist film prior to developing the substrate to which the resist is coated".

In contrast, a cited reference (US Patent No. 5,626,913) neither discloses nor suggests the structure of the present invention.

In the cited reference (US Patent No. 5,626,913), when supplying a developing solution onto the resist, the supply amount of the developing solution is gradually increased to cause the developing solution to spread smoothly on the resist film. As a result, the uniformity of the resist film is improved in the direction of the surface of the substrate. However, unlike the invention of this application, the distribution of the dissolving characteristic of the resist against the developing solution is not controlled in the direction of the thickness of the resist film.

In other words, by the substrate processing apparatus according to the invention of this application, the dissolving characteristics of a resist against a developing solution are distributed in the direction of the thickness (depth) of a resist film, with the result that a layer that is easily dissolvable against the developing solution and a layer that is uneasily dissolvable against the developing solution can be contrastively formed. In other words, a layer in which the development of the resist is promoted and a layer in which the development of the resist is demoted can be formed. As a result, the reaction speeds of the development can be varied in the direction of the thickness of the film. For example, when a layer that is easily dissolvable against the developing solution is formed on the front surface side of the resist film, only the front side can be developed. Thus, even if the exposure depths and exposure widths vary with half-exposed regions, the uniformity of the residual film of the half-exposed regions can be improved. As a result, the distances of electrodes that will be formed later become uniform. This effect specific to the invention of this application can be obtained.

With regard to claim 23

The substrate processing apparatus according to the invention of this application includes "a heating portion for heating the resist coated on the first surface of the substrate from the first surface side and the second surface side so that a first layer obtained by baking the resist is formed on a front surface side of the resist, a second layer heated is formed on a rear surface side of the resist, and a

third layer containing moisture is formed between the first layer and the second layer".

In other words, the resist coated on the first surface of the substrate by the coating portion is heated from the first surface side and the second surface side of the substrate so that the first layer, the second layer, and the third layer mentioned above are formed, and then the heated substrate is transferred to the exposing unit by the interface portion.

In contrast, a cited reference (Pub. No. US 2002/0076658 A1) neither discloses nor suggests the above-mentioned structure of the present invention.

In the cited reference (Pub. No. US 2002/0076658 A1),, the temperature of the substrate is only adjusted by the temperature—adjusting unit 61 in the interface portion S2 before exposure. Unlike the invention of this application, there is no description that the surface of the resist is baked to form the first layer.

That is, the substrate processing apparatus according to the invention of this application includes "a heating portion for heating the resist coated on the first surface of the substrate from the first surface side and the second surface side so that a first layer obtained by baking the resist is formed on a front surface side of the resist, a second layer heated is formed on a rear surface side of the resist, and a third layer containing moisture is formed between the first layer and the second layer".

Therefore, the resist can be dried from the rear surface side of the substrate. In addition, the front surface of the resist can be baked and hardened. The front surface of the resist is baked and hardened so as to prevent moisture from evaporating from the rear surface that is heated. As a result, a constant amount of moisture resides in the resist. Consequently, a flat layer whose moisture content is small is formed on the rear surface side of the resist. A layer that contains residual moisture is formed from the front surface of the resist to the intermediate portion thereof. To cause the resist to exposure—react, moisture is required. When the

resist is half-exposed, a region whose moisture content is small does not exposure-react. Thus, the flat layer on the rear surface side of the resist is not exposed. When the resist is developed, the flat layer that does not exposure-react becomes a residual film. As a result, a flat layer as a residual film that is not affected by exposure amount can be formed after the resist is developed. Thus, the dissolving characteristic of the resist can be controlled in the direction of the depth of the resist. Consequently, the uniformity of a residual film of a region that has been half-exposed can be improved. This effect specific to the invention of this application can be obtained.

With regard to claim 24

The substrate processing apparatus according to the invention of this application has a structure in which "the heating portion includes: a first heating plate for heating the resist coated on the first surface of the substrate from the first surface side at a first temperature; and a second heating plate for heating the resist coated on the first surface of the substrate from the second surface side at a second temperature".

In contrast, a cited reference (Pub. No. US 2002/0123011 A1) neither discloses nor suggests the above-mentioned structure of the present invention.

In the cited reference (Pub. No. US 2002/0123011 Al) , as shown in FIG. 11, provided are the hot plate 202 for heating the wafer W, the heater 203 provided to the hot plate 202, and the heater 1109 provided to the plate 1107. However, the heater 1109 is provided for preventing the solvent of the resist as an evaporated substance coated on the wafer W from liquefying on the plate 1107 (paragraphs [0157] and [0158] in Pub. No. US 2002/0123011 Al). Unlike the invention of this application, the heater 1109 is not provided for forming the third layer containing moisture between the first layer and the second layer in consideration of the half-exposing process of the resist.

In other words, in the substrate processing apparatus according to the invention of this application, the first layer is formed on the resist by the first heating plate, the second layer is formed by the second heating plate, with the result that the third layer containing moisture can be formed between the first layer and the second layer.

With regard to claim 25

The substrate processing apparatus according to the invention of this application includes "a first nozzle for coating to the substrate held by the holding portion a first resist that exposure-reacts with first exposure energy; a second nozzle for coating to a surface of the first resist a second resist that exposure-reacts with a second exposure energy smaller than the first exposure energy, the second resist being exposed integrally with the first resist; and a driving portion for driving at least the second nozzle along with the surface of the substrate held by the holding portion while the second resist is coated to the surface of the first resist from the second nozzle".

In a cited reference (US Patent No. 6,371,667), the resist coating unit 15 includes the first nozzle N1 for coating the first resist to the substrate and the second nozzle N2 for coating the second resist to the substrate (see FIG. 4 and FIG. 5), and these nozzles are movable in the radial direction of the substrate for exchange (see FIG. 28).

However, the cited reference (US Patent No. 6,371,667) does not include a description about "a driving portion for driving at least the second nozzle along with the surface of the substrate held by the holding portion while the second resist is coated to the surface of the first resist from the second nozzle" of the invention of this application.

In a cited reference (US Patent No. 6,300,043),, there is a description that the acidic solution 4 (TARC film) is supplied onto the resist film 3 (FIG. 6B) to make the resist film 3 thinner than the initial state (FIG. 6E).

However, in the cited reference (US Patent No. 6,300,043), in the process of making the resist film 3 thinner, the resist film 3 and the acidic solution 4 (TARC film) are only temporarily laminated. That is, in the cited reference (US Patent No. 6,300,043),, the acidic solution 4 does not remain on the resist film 3 at the time of the exposure. Therefore, unlike the invention of this application, the exposure cannot be performed in a state where the second resist is laminated on the first resist.

That is, in the substrate processing apparatus according to the invention of this application, the second resist that exposure-reacts with a second exposure energy smaller than the first exposure energy and that is exposed integrally with the first resist is coated to a surface of the first resist by the second nozzle, and the exposure reaction of the first resist can be separated from the exposure reaction of the second resist through half—exposure. Thus, after the resists are half-exposed, the uniformity of the residual film of the resists can be improved.

It is respectfully submitted that none on the applied art, alone or in combination, teaches or suggests the features of the claims as discussed above. Thus, one of ordinary skill in the art would not be motivated to combine or modified the features of the applied art because such combination or modification would not result in the claimed invention. As a result, it is respectfully submitted that claims 22-25 are allowable over the applied art.

Withdrawal of the rejection is respectfully requested.

Newly-added claims 26-30 also include features not shown in the applied art.

Further, Applicants assert that there are also reasons other than those set forth above why the pending claims are patentable. Applicants hereby reserve the right to submit those other reasons and to argue for the patentability of claims not explicitly addressed herein in future papers.

In view of the foregoing, reconsideration of the application and allowance of the pending claims are respectfully requested. Should the Examiner believe anything

further is desirable in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' representative at the telephone number listed below.

Should additional fees be necessary in connection with the filing of this paper or if a Petition for Extension of Time is required for timely acceptance of the same, the Commissioner is hereby authorized to charge Deposit Account No. 18-0013 for any such fees and Applicant(s) hereby petition for such extension of time.

Respectfully submitted,

Date: July 18, 2007

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